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C. F. Curtis Riley.

Nature-Study Teaching

C. F. CURTIS RILEY
The New York State College of Forestry, Syracuse University
Syracuse, New York

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NATURE-STUDY TEACHING[1]

C. F. CURTIS RILEY

The New York State College of Forestry, Syracuse University
Syracuse, New York

We may theorize and speculate just as much as we please regarding the "why" and the "wherefore" of nature-study and accomplish but little of material value. There seems to be an idea prevalent in some quarters that we are all "up in the air" on this subject. The writer believes that some workers who have shown considerable interest in nature-study do take this point of view—if it is a point of view; but he is inclined to believe that this is due in great part—there may be other reasons—to the fact that these men are not actively engaged in nature-study teaching.[2] Not infrequently the college and university instructor is apt to belong to this group; and yet on the other hand the writer wishes to state clearly that some of the sanest and most workable ideas regarding nature-study teaching have been advanced by men in institutions of this class.

Some of us do not wish to be classified with this "up in the air" group, for our ideas regarding the teaching of nature-study, in part at least, have become more or less clarified and definite. The writer, in a measure, can appreciate this position, yet he believes that we should not permit it to concern us too much; but should continue to put into practice the ideas that we already possess. The writer's work in nature-study has been chiefly with students of two classes—those in normal schools preparing to become teachers in the graded schools and in the high schools, and summer work with those of college grade. It is regarding some of the work with students of the former class to which he wishes to draw attention.

A large proportion of the nature-study work that is being done is for the purpose of preparing teachers to present this subject in the graded schools. At the present time and also for many years to come, the writer believes that the subject matter should be drawn from the natural sciences—the biological sciences. Therefore the teacher of nature-study in the normal school or teachers college should be a trained biologist with a liking for animal and plant behavior, and also some knowledge of agriculture and physiography. By this the writer does not wish to be

1 This article was first published when the writer was Head of the Department of Biology and Curator of the Museum at the State Normal School, Mankato, Minnesota.

2 The term "nature-study teaching" is used here in the sense that it is used in the normal school.

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understood as stating that chemical, physical, geological, and even astronomical topics are not integral parts of nature-study; but he is convinced that the great majority of graded schools are not prepared for such work at present. It is necessary and pertinent that such topics shall be presented by the instructor in nature-study to his prospective teachers as can be put to practical use in their own schoolrooms. The writer is thoroughly convinced that much of the failure of nature-study as a part of the graded school curriculum can be attributed to the presentation of this multiplicity of subjects and to the fact that some of the instructors under whom the graded school teachers have studied were physicists and chemists instead of biologists. The writer feels assured that many instructors in nature-study will agree with him in respect to the two last statements. The writer does not assume this viewpoint because he is a biologist, for during his undergraduate work in college he was much interested in chemistry, physics, and geology, and has given instruction in these sciences both in the high school and the normal school and therefore fully realizes their importance.

Under present conditions in the graded schools the time element is an important factor in nature-study teaching and the writer believes that it is much more practical and feasible to teach the subject through the agency of the biological sciences than it is to present the subject from the physical and chemical point of view. Furthermore the facilities—suitable conditions and apparatus—are not to be obtained for such work in the graded schools. Much of the work of this nature that the writer has observed has shown itself to be practically worthless; in a great measure it has been time wasted so far as any return to the pupils is concerned. On the other hand, much valuable work can be accomplished, and is being accomplished, in nature-study from the biological viewpoint. Such study can be well carried on in the average *well-lighted* schoolroom. Comparatively little additional expense needs to be incurred, as no special apparatus is required for much of the work.

A school museum is one of the most helpful factors in nature-study teaching, but very few of the graded schools possess one. In large cities this problem can be solved, partially at least, by making use of the municipal museums. This can be done by taking the children there after school hours or on Saturdays. But there are thousands of graded schools in the small towns and villages —not forgetting the country schools—where there are no museums. Thus much depends upon the teacher. If she is adapt-

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able this lack can be largely provided for. She can in a few years build up a school museum—or at least a museum for her own pupils. Much material can be collected at no expense except that of time and labor. Insect collections can be obtained; nests of the mud dauber and paper wasp are easily collected; pupæ, chrysalides and insect cocoons are frequently to be found; crayfishes, frogs, toads, fishes, aquatic insects and larvæ may be kept permanently in formalin—an inexpensive preservative. Mason fruit jars can be used as containers for this purpose. Buds, stems, and mosses are readily preserved in alcohol, or formalin; dry seeds of many kinds may be kept indefinitely in small boxes, more satisfactorily in mason jars. Flowers, plants, and leaves may be pressed to form a small school herbarium. The uses of such a school museum may be further augmented by the purchase of a few inexpensive tanks in which fishes, frogs, crayfishes, and aquatic larvæ may be kept alive in the schoolroom—as children are vividly interested in living things. Many of the hardier plants may be kept in window boxes, so that simple botanical facts may be learned from living things. Beside this, in the spring and autumn small school gardens can be prepared. Field trips can be made either after school has been dismissed, or on Saturdays, if there is not sufficient time during regular school hours. Then there is always a large supply of material to be obtained free of charge out of doors, for the teacher who knows where to find it. These are only a few of the opportunities that are open to the graded school teacher who has had careful instruction from a trained biologist.

The writer formerly was engaged, specifically, in the profession of training teachers, in the normal school and the teachers college. Knowing so well the lack of material for use in nature-study in the graded schools, he made it one of the requirements for many years for each student, taking courses in the department of biology, who was planning to teach nature-study, to prepare an insect collection of one hundred forms classified to the family, and a herbarium of tree leaves and of common plants, each of fifty species. Aside from the value of the training received from work of this character, it provided against the contingency of the prospective teacher being entirely without material for work when she reached her field of labor. Many of the writer's former students have stated from time to time that they have found such material very useful and that they have used it over and over again in their nature-study teaching, both in the grades and in the high school.

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In the writer's classes usually there was used some good textbook. Holtz's "Nature-Study" and Hodge's "Nature-Study and Life" were found to be very useful. Sometimes simple informal talks were given to the prospective teachers, but no notes were required, for the writer believes that note-taking by students —for the purpose of preparing a future lesson—lower than college juniors is pedagogically wrong. The emphasis in the work was placed primarily upon the practical side—the laboratory and field work. Living plants and animals were used as much as possible for illustrative material, and students were encouraged to plan to do the same in their grade teaching. Detailed descriptive notes in the laboratory were reduced to a minimum and in place of these the writer introduced the plan of making many outline drawings with full descriptions of the same which were carefully examined at the close of each laboratory period. This was done largely for two reasons. The first reason was because the writer found that his time could be used to far better advantage in behalf of his classes than in correcting piles of notebooks from fifty to sixty students each day. All drawings with accompanying descriptions of the plates were carefully looked over and corrected at the close of each laboratory period. The writer is convinced that the work in connection with the notebook is almost valueless unless carefully checked by the teacher and errors corrected by the students. No written work was done in the writer's classes that was not carefully examined; this he made an inviolable rule. It is evident that the task of correcting so large a number of papers was no light task; when this was augmented by detailed descriptive notes the problem became appalling. It is possible that the writer would have required more descriptive written notes, if the state had provided more competent assistance for routine work in the laboratory and for the correction of notebooks.[3] The second reason for reducing the amount of written descriptive work in the laboratory was because of its psychological effect on the student. Young students, even those who were already graduates of the high school, frequently became slaves to the notebook. They formed the note-taking habit to the great detriment of the real scientific part of their work. The writer has frequently witnessed, both in normal school and college, the loss of mental spontaneity and buoyancy of spirit and an almost entire loss of true interest in nature-study because of the undue importance placed upon the work of the notebook.

3The writer has little sympathy for a certain policy that is very common in many schools—the organization of new departments of instruction—when assistance is much needed in those already established.

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The writer wishes to criticise sharply a certain practice that he has observed by some teachers in laboratory teaching, and that is the correction of notebooks or other work in the laboratory, or in another room close by, while the laboratory work is in progress. This is a glaring pedagogical error. The writer is convinced that there is no form of instruction that requires closer attention on the part of the teacher than that of the laboratory. The instructor should be present throughout the period, constantly encouraging, criticising, and helping. The experience of the writer has proven that the laboratory work, if well done, is far more taxing than either the recitation or the lecture. To obtain satisfactory results he has found it necessary to give the laboratory work the closest sort of attention.

During the laboratory periods the writer seldom used a manual, but in place of this gave oral directions, having a general plan, or outline of the laboratory work made out beforehand. The writer constantly asked questions of his students while the laboratory work was in progress. Frequently the laboratory section was asked to verify the description of a structure, that the teacher had explained, from the specimen in the dissecting pan on the desk before them; or they might be asked to find and describe some structure which the teacher had simply named to them. Not infrequently comparisons were asked for of the same structure observed by a number of different students. Then again several members of the class might be sent to the blackboard to make simple outline drawings of observed structures, in order that comparisons might be made regarding individual observations. The placing of such drawings on the blackboard visualized difficult points for the benefit of the entire class.

It is absolutely essential that these prospective teachers of nature-study should be instructed as to the manner in which the subject is to be presented in the grades, and also necessary that they should carry away with them a certain amount of biological information; yet it has been the writer's chief concern to arouse and stimulate their interest in the wonderful world of nature and to assist them to retain this interest and later to impart it to others.

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